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Agricultural Research Service

Medical & Veterinary Entomology Research Laboratory

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HISTORY

During World War II, the United States Department of Agriculture cooperated with the U. S. Department of Defense to establish a research laboratory in Orlando, Florida. The mission of the Orlando Laboratory was to develop technology for protection of military personnel against insect vectors of disease. In 1951, the name was changed to the Insects Affecting Man and Animals Research Laboratory. In 1961, the Secretaries of Defense and Agriculture signed a Memorandum of Understanding to continue the research program under USDA funding. In 1963, the Laboratory moved into new facilities adjacent to the University of Florida at Gainesville. The Laboratory's name was changed to Medical and Veterinary Entomology Research Laboratory (MAVERL) in 1990.

MISSION

The overall mission remains much the same as in 1942 when the Laboratory was first established. The mission of MAVERL is to develop technology and integrated management strategies for insects and other arthropods of medical and veterinary importance. This mission includes the development of safer and more effective chemical control technology and the development of alternative technologies such as biological and genetic control. The mission of MAVERL is primarily in support of the Departments of Agriculture and Defense. However, results of research apply to programs of international, national, state, and local government agencies, private industry, and the public. To accomplish this mission, MAVERL employs a staff of 25 to 35 scientists and 50 or more technicians and other support personnel. This mission is further supported by about 45,000 sq. ft. of H/AC space in modern facilities.

MAVERL also has modern equipment for acquisition, management, analysis, and documentation of research results.

RESEARCH ACCOMPLISHMENTS

Research accomplishments at MAVERL are due to multidisciplinary team research and a wide range of cooperative efforts. Scientists at MAVERL interact with cooperating scientists, government organizations, and insect pest and vector management programs on a world-wide basis. Cooperators include the U. S. Department of Defense, World Health Organization, International Atomic Energy Agency, Animal and Plant Health Inspection Service, Departments of Agriculture in Brazil and Argentina, Tennessee Valley Authority, University of Florida and other State Universities, mosquito control programs in several states, National Pest Control Association, other ARS laboratories, and commercial companies.

The research accomplishments of MAVERL are documented in >2,600 publications in scientific journals, conference proceedings, books, book chapters, handbooks, and other documents. Publication records are managed in a computerized database management system. Publication reprints are retrieved by author, year, and key words in titles and abstracts. Reprints or lists of reprints of MAVERL publications are furnished upon request.

MAVERL has an outstanding record of chemical control research accomplishment. Research in the 1940's and 1950's with chlorinated hydrocarbon insecticides was replaced with research on currently-used and biodegradable pesticides. Research accomplishments with biodegradable pesticides and personal protection chemicals are: (1) synthesis and development of deet, the principal active ingredient in most insect repellents, (2) development of the ultra-low volume (ULV)

method of insecticide application for use in mosquito control programs, (3) development of a bait system for control of imported fire ants which is the basis for all commercial formulations, (4) development of a clothing treatment for personal protection against arthropods, and (5) discovery of a new class of chemical toxicants for use in insect baits.

Other outstanding research accomplishments of MAVERL include: (1) identification of a sex and aggregation pheromone of the housefly which was commercialized as an additive for bait formulations, (2) housefly and stable fly control by inundative release of pupal parasites, (3) demonstration of the effectiveness of sterile male releases against natural populations of tsetse flies, the stable fly, and two species of mosquitoes, (4) housefly control with chemosterilant baits, (5) development of genetic sexing strains of two species of mosquitoes, the housefly, and the stable fly, (6) discovery that lactic acid is one component in human emanations which attract mosquitoes, (7) use of a predator species of mosquito for control of the yellow fever mosquito, (8) GC analysis of cuticular hydrocarbons of insects for their identification, (9) identification of imported fire ant pheromones which have potential use in species-specific bait systems, (10) discovery of sibling species of an anopheline mosquito in the Southern U. S., (11) mass rearing methodologies for mosquitoes and flies which could be used in sterile insect release control programs, (12) integrated management strategies for cockroaches and fleas, (13) control of populations of peridomestic cockroaches with parasites, and (14) development of comprehensive computer software for simulation of the effects of control technologies on populations of arthropod pests and vectors of disease, and (15) development of a mass injection technique for introduction of DNA into insect embryos which will be useful in insect and plant genetics.

MANAGEMENT & SCIENTIFIC STAFF

G. A. Mount, Laboratory Director, (904) 374-5900

R. W. Clegern (Colonel, U.S. Air Force) Liaison Officer, Armed Forces Pest Management Board, 374-5950

RESEARCH UNITS

Modeling & Bioengineering

G. A. Mount, Research Leader, (904) 374-5900
D. A. Focks, Research Entomologist, 374-5976
D. G. Haile, Lead Scientist/Engineer, 374-5928

The objective of this Unit is to develop comprehensive, weather-based computer simulation models for arthropods of medical and veterinary importance. Computer simulation models include population growth, management technologies and disease transmission. Simulation research provides an increased understanding of population dynamics and disease transmission. Computer simulations are used to develop integrated management strategies.

Imported Fire Ant and Household Insects

R. S. Patterson, Research Leader, (904)374-5910
R. J. Brenner, Research Entomologist, 374-5937
J. B. Hoy, Research Associate, 374-5991
J. H. Klotz, Research Associate, 374-5989
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J. I. Moss, Research Entomologist 374-5911
D. H. Oi, Research Associate, 374-5946
S. D. Porter, Research Entomologist, 374-5914

D. F. Williams, Research Entomologist, 374-5982
D. P. Wojcik, Research Entomologist, 374-5986

The research goals of this Unit are the development of control technologies and integrated management strategies for imported fire ants, cockroaches, and fleas. Areas of research include pesticide control, bait systems, repellents, taxonomy, chemotaxonomy, toxicology, pheromone chemistry and behavior, biological control, behavior, dispersal, sociobiology, bioecology, and population dynamics. The research capability of this Unit is enhanced by a cooperative effort with the University of Florida.

Mosquito & Fly

D. R. Barnard, Research Leader, (904) 374-5930
J. J. Becnel, Biologist, 374-5961
T. Fukuda, Microbiologist, 374-5938
J. J. Garcia, Visiting Scientist, 374-5961
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J. A. Hogsette, Research Entomologist, 374-5912
T. Jensen, Research Entomologist, 374-5913
D. L. Kline, Research Entomologist, 374-5933
C. E. Schreck, Research Entomologist, 374-5968
A. H. Undeen, Research Entomologist, 374-5966

Development of integrated management systems for mosquitoes, biting gnats, and filth breeding flies is the central theme of research efforts in this Unit. Specific areas of study are: (1) the population dynamics, biological control, and integrated management of filth breeding flies, (2) the use of microbial pathogens for the biological control of aquatic Diptera, (3) growth, development, reproduction, phenology, and behavior in mosquitoes and biting gnats, (4) the ecological and behavioral bases of host attraction, host selection, and feeding by mosquitoes and biting gnats, and (4) repellents, toxicants, and application methodologies for personal protection of humans against bloodfeeding arthropods.

Genetics & Molecular Biology

J. A. Seawright, Research Leader, (904)374-5940
D. A. Carlson, Research Chemist, 374-5929
A. F. Cockburn, Research Geneticist, 374-5873
J. E. Conn, Visiting Scientist, 374-5932
G. N. Fritz, Research Entomologist, 374-5823
G. L. Hehman, Molecular Biologist, 374-5951
M. Y. Hosack, Chemist, 374-5915
P. E. Kaiser, Entomologist, 374-5973
S. E. Mitchell, Research Entomologist, 374-5988
R. K. Vander Meer, Research Chemist, 374-5918

This Unit synthesizes new technologies for either control or eradication of arthropods of medical and veterinary importance through the study of genetics and molecular biology. Areas of research include population genetics, genetic control, genetic engineering, and biochemistry. The manipulation of biochemical and genetic mechanisms could lead to more efficient, pollution-free methods for the control of arthropods.

Research Areas of the Medical and Veterinary Entomology Research Laboratory

- *Attractants*
- *Behavior, bioecology, and population dynamics*
- *Biological control with pathogens, parasites, and predators*
- *Chemotaxonomy*
- *Computer simulation modeling*
- *Feeding behavior of bloodsucking insects*
- *Genetic engineering*
- *Genetic control*
- *Pesticide control*
- *Pesticide resistance*
- *Pheromones*
- *Population genetics*
- *Repellents*

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